



# Hybrid watermilfoil

## A Case Study

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ILMA Conference 03.15.19

# Candlewick Lake | Boone Co., IL

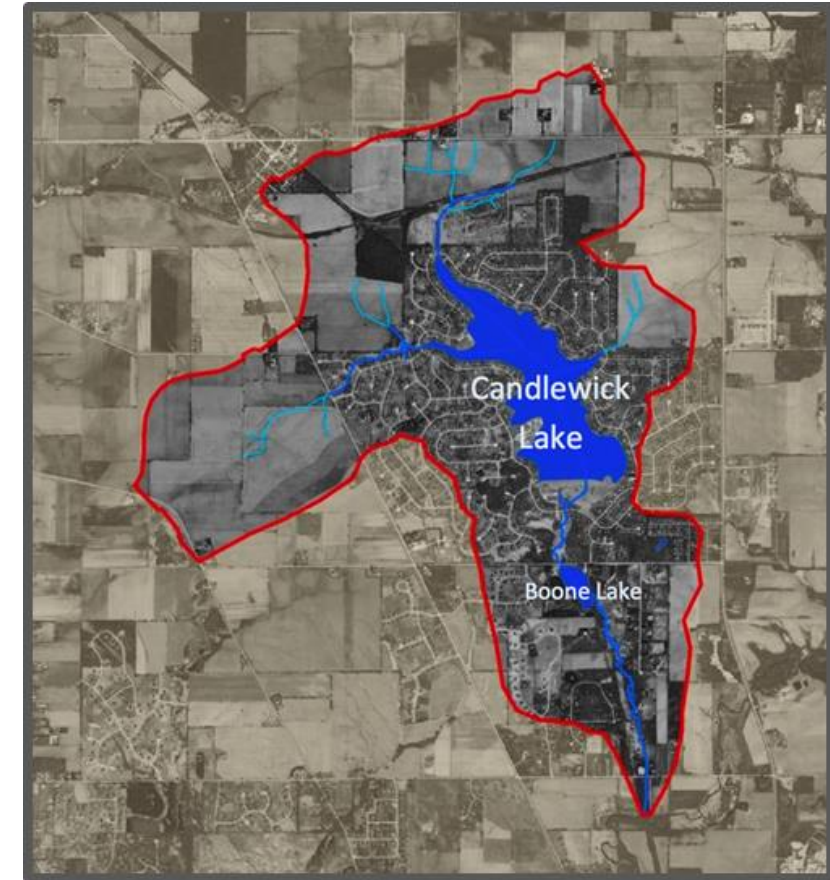
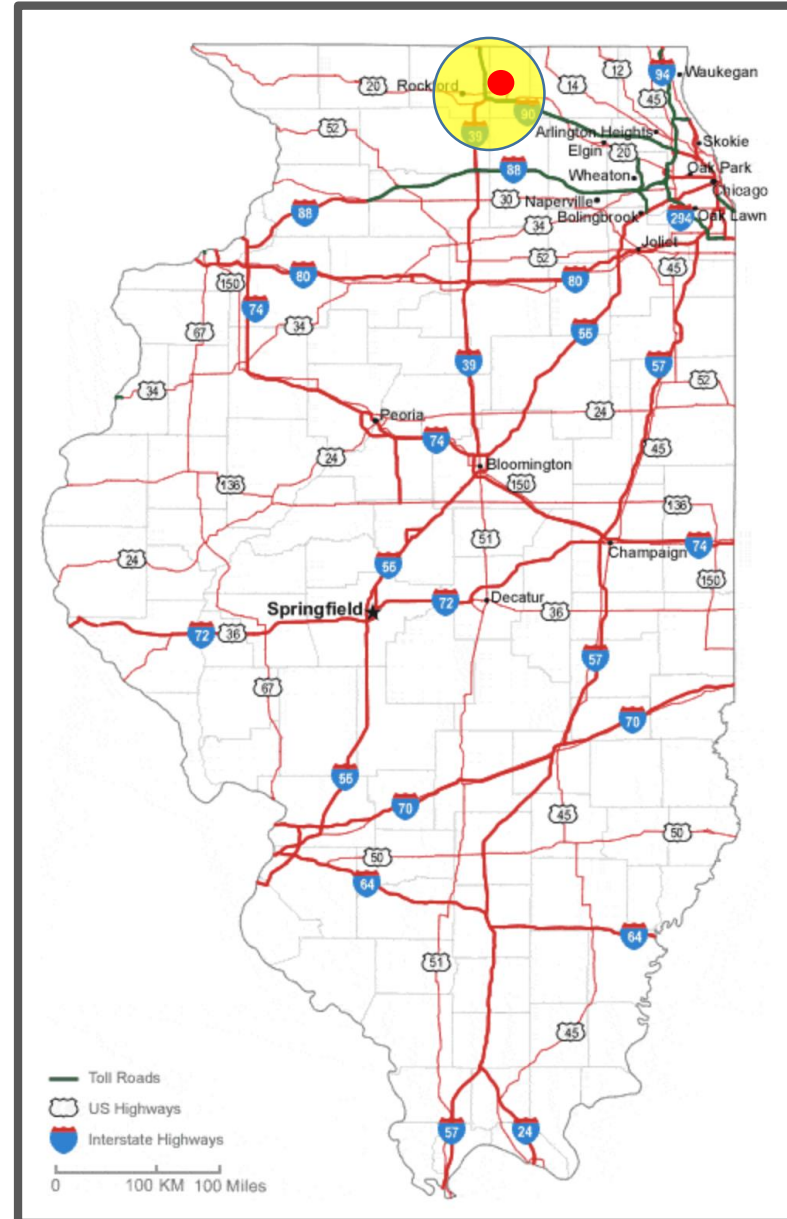


BACKGROUND

# Site History

Northern Illinois just northeast of Rockford

- 210 Acres (~ 2,200 acre watershed)
- Constructed early 1970's
- Full pool in 1975
- Maximum Depth: 24 ft
- Average Depth: 7.29 ft
- Photic zone ~9 ft



# Water Sources

- Direct precipitation
- Storm water flow – Residential Development
- Drain tile - farms
- Storm water flow - farms
- 1979 - 1999 - Waste water discharge effluent





# Water Balance



## Inflow

- Tile inflow: 652 acre ft
- Ag surface flow: 160 acre ft
- Rainfall: 402 acre ft
- **Total Inflow: 1,214 acre ft annually**

## Outflow

- **Dam outflow: 1,046 acre ft annually**



# Aquatic Vegetation



- Lake dominance has shifted several times:

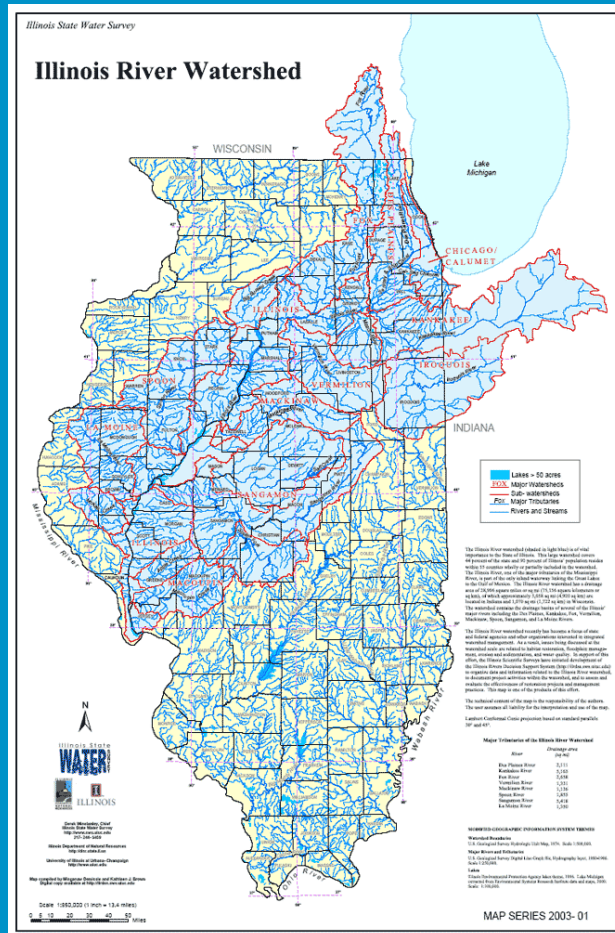
Aquatic macrophyte to planktonic

- Historical issue with curly-leaf pondweed
- Developed aquatic plant management program in 2012 going forward
- Plant community diversity increased
- Improvements in water clarity and water quality



# Lake Management

- Work diligently to balance macrophyte vs planktonic
- Blue green algae of concern
- Developed 9-point EPA 319 watershed plan
- Implemented EPA 319 watershed plan





# Hybrid watermilfoil (HWM)



- 2016 – Small patch of milfoil observed near boat ramp
- Sent to U of I Extension office for review
  - Classified as Northern Milfoil – Told to monitor
- By the end of 2016, milfoil had spread and was determined to be of serious concern
- I recommended Candlewick work with Clarke Aquatics



# ANALYSIS

# Data Collection

- Bathymetry
- Water volume
- Vegetation Density
- Flow Rate
- Genetic ID
- Bioassay AI's

## data

[dey-tuh, dat-uh, dah-tuh]

*noun*

Facts and statistics collected together for reference or analysis.



# Program Objectives

- Scientifically sound
- Water quality
- Reduce community anxiety
  - Maintain enjoyable resource
  - Community Education
- Macrophyte/planktonic balance
- Respect the resource
- Budget properly



# November 2016

- Survey
  - Vegetation
  - Bathymetry
- Specimens submitted
  - Not viable for genetic ID or bioassay



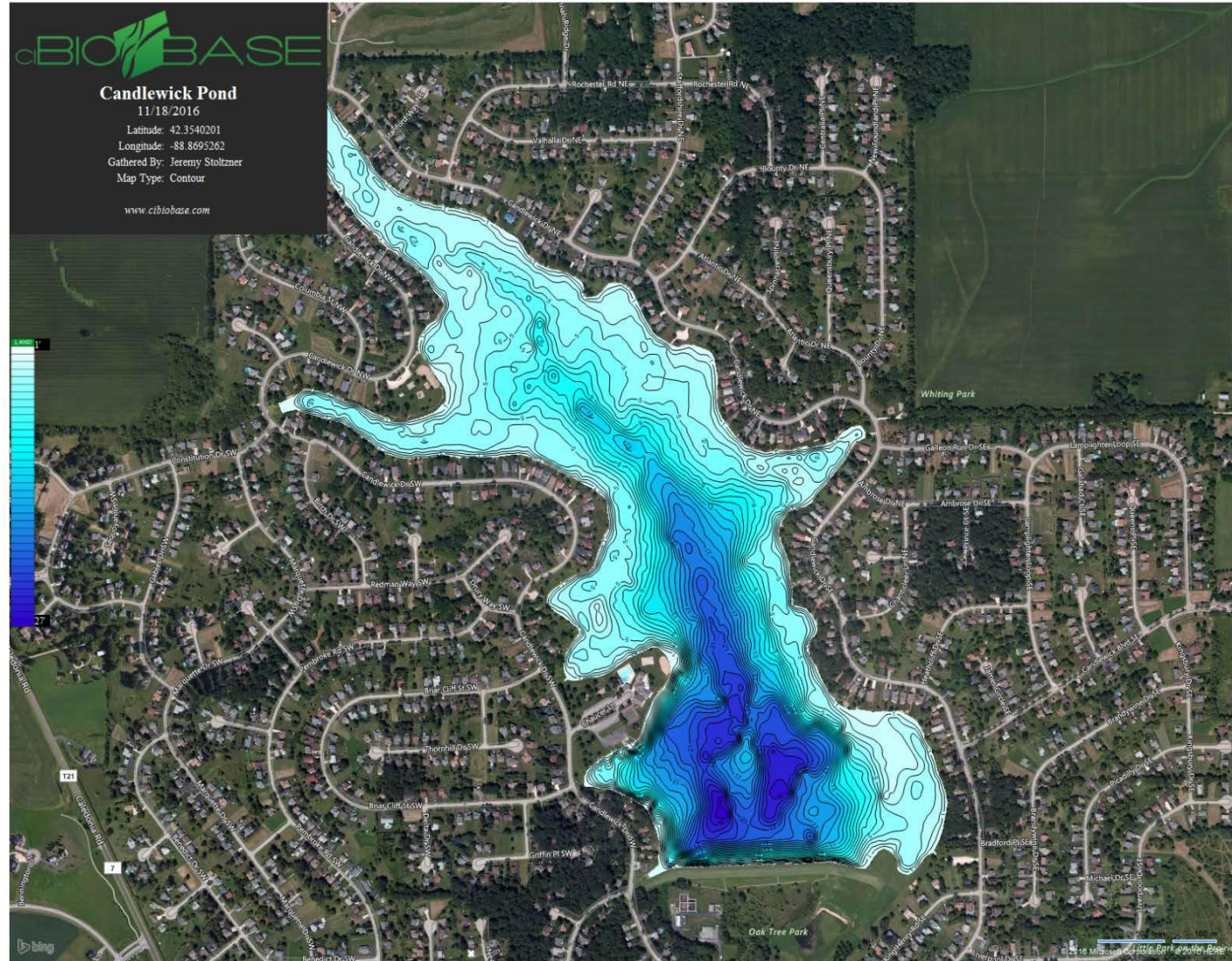


# Acoustic Mapping

209.88 surface acres

Max Depth 24 feet

Avg. Depth 7.29 feet



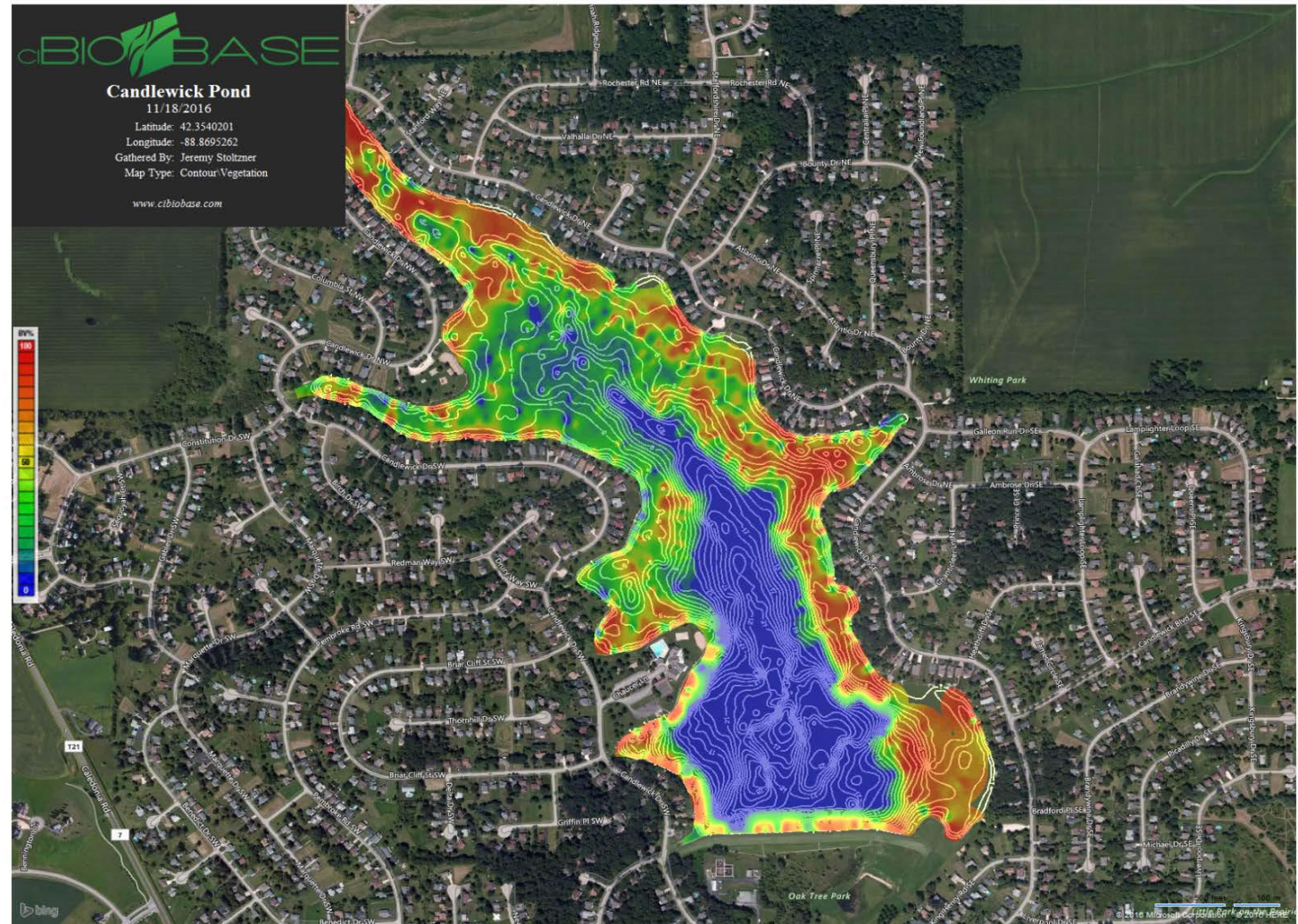


# Vegetation Density

50% covered in HWM

Some coontail

11/18/16

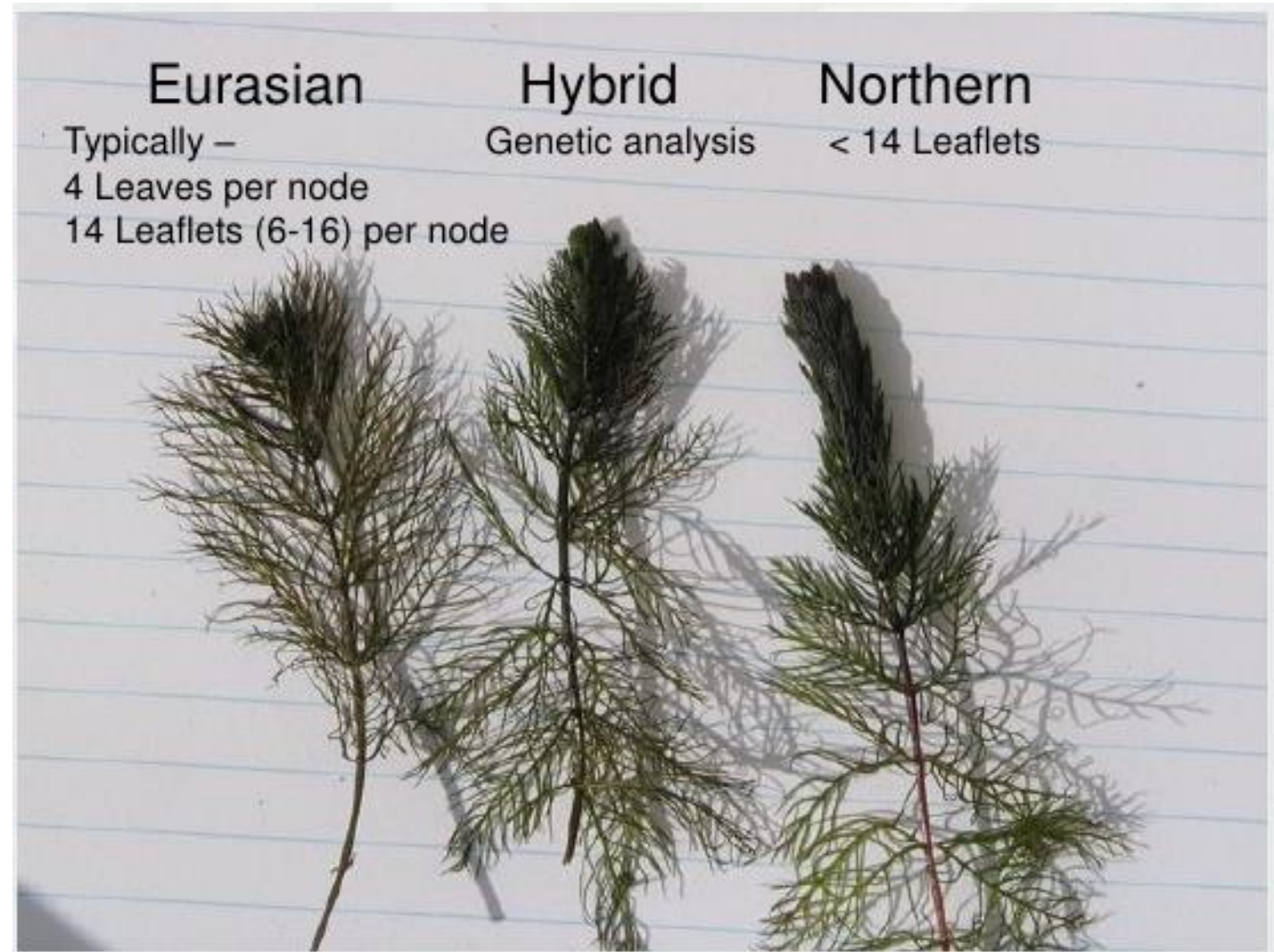


# Hybrid watermilfoil



# Eurasian watermilfoil & Northern watermilfoil hybrids

Wide genetic diversity



# Specimen Collection

- April 17<sup>th</sup> 2017
- Genetic Identification
- Bioassay – SePRO PlanTEST





# GENETIC CONFIRMATION

## Summary of DNA Data for Watermilfoil

GenPass, LLC

Lake Name: Candlewick Date Received: **04-18-2017**

Number of Samples Sent: 7 Number of Samples Processed: 7

Area/site	Sample #	ID
1	1	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )
2	2	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )
3	3	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )
4	4	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )
5	5	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )
6	6	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )
7	7	Hybrid watermilfoil ( <i>Myriophyllum spicatum</i> x <i>M. sibiricum</i> )

Comments: NA Genetic IDs:



# Bioassay turnaround

Stop gap adaptive  
approach 2017

pa·tience.

[ˈpāSHəns]

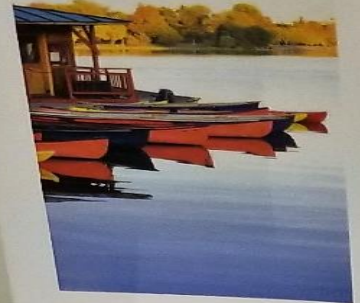
NOUN

the capacity to accept or tolerate delay, trouble, or suffering without getting angry or upset.



# Community Education

- Multiple meetings
- Routine updates
- Educational hand outs



Healthy Waters  
Candlewick  
Lake  
2018 Review



## MILFOIL UPDATE

**Remember the end of 2016?**  
That is when residents of Candlewick Lake were surprised to see large amounts of hybridized water milfoil appear. After lab testing confirmed this was the invasive hybridized species, a series of "burn back" herbicide treatments provided recreational and visual relief through the 2016 season while an optimal treatment protocol was developed.

### 2017 — Patience While Testing

Three key steps lead to the final treatment plan:

1. Waited for growth to emerge and took samples.
2. Sent samples off for genetic testing to confirm plant species, verified existence of hybrid milfoil.
3. Sent samples to independent lab to do bioassay work to determine which control products would be most effective on the species spectrum in Lake Candlewick.

In the interim, contact treatments maintained the lake short-term, while the best long-term treatment plan was determined.



Hybridized milfoil is more predominant in the shallow, warmer waters, as reflected by the map below. Red is the most intense weed density, then yellow then green then blue. Above: from the 1/18/16 survey.



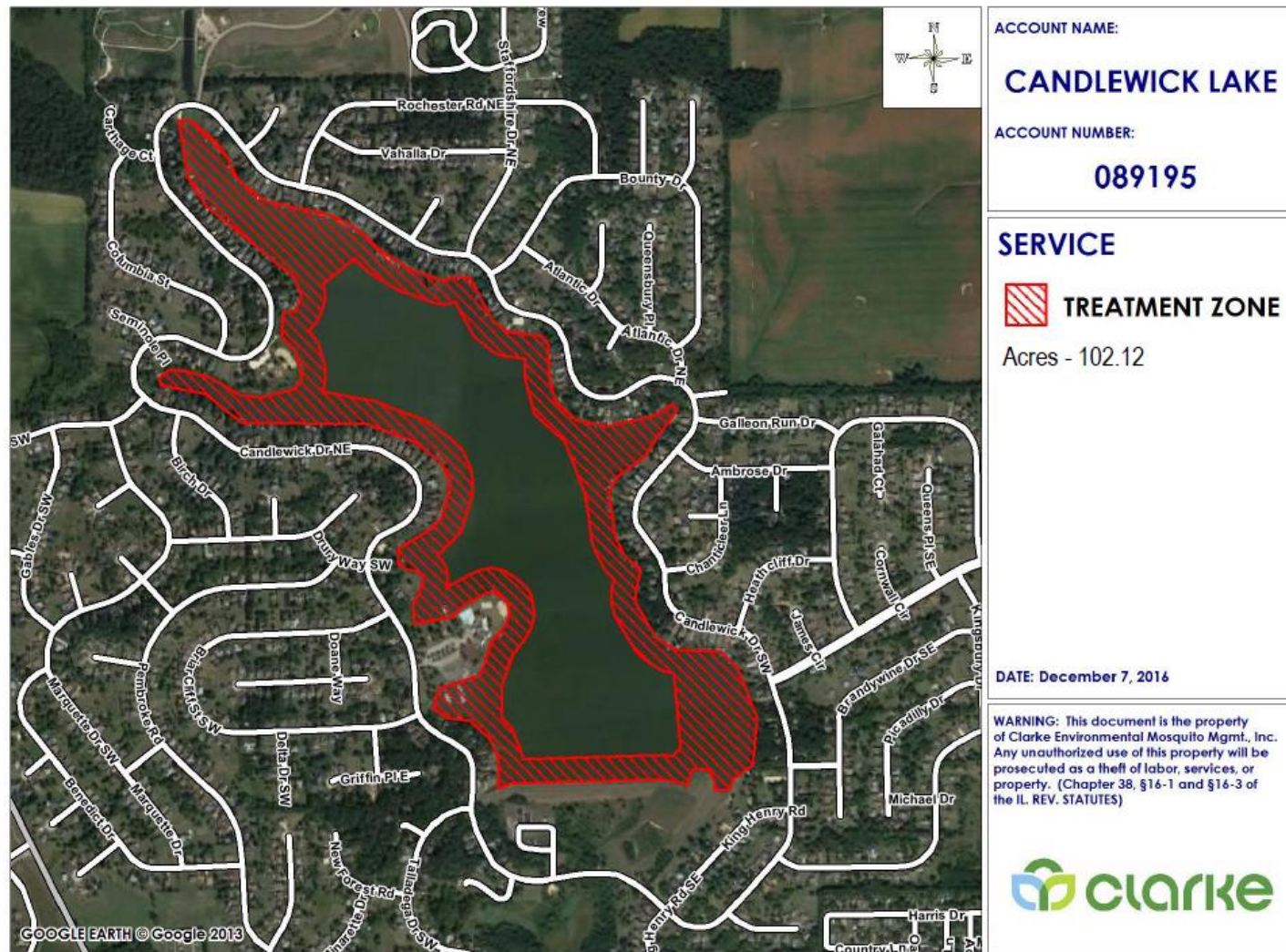
**Candlewick Lake Health in Maps**  
The maps above reflect the full lake health assessment done in late 2016 (top), 2017 (immediately above), and August of 2018 (on back).





# Adaptive Management

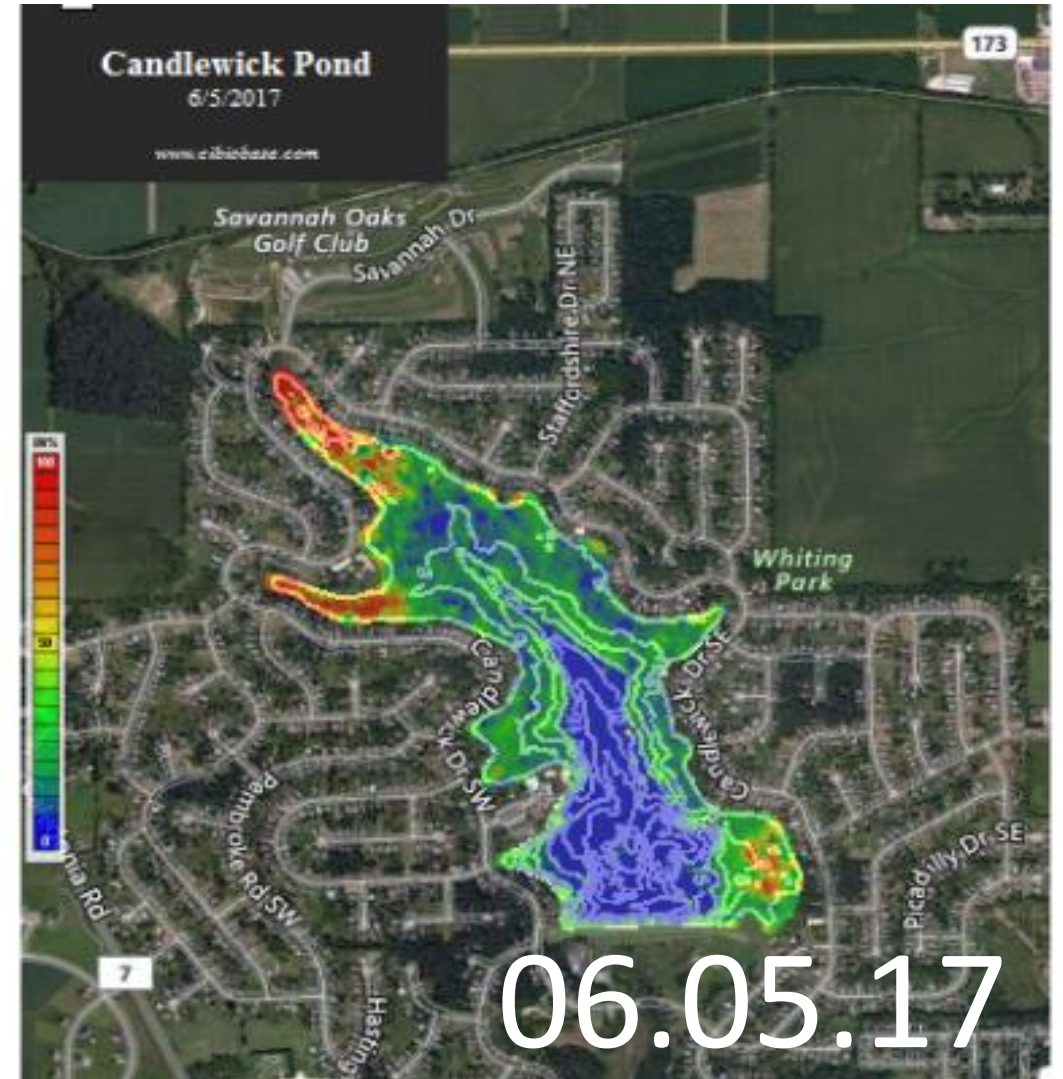
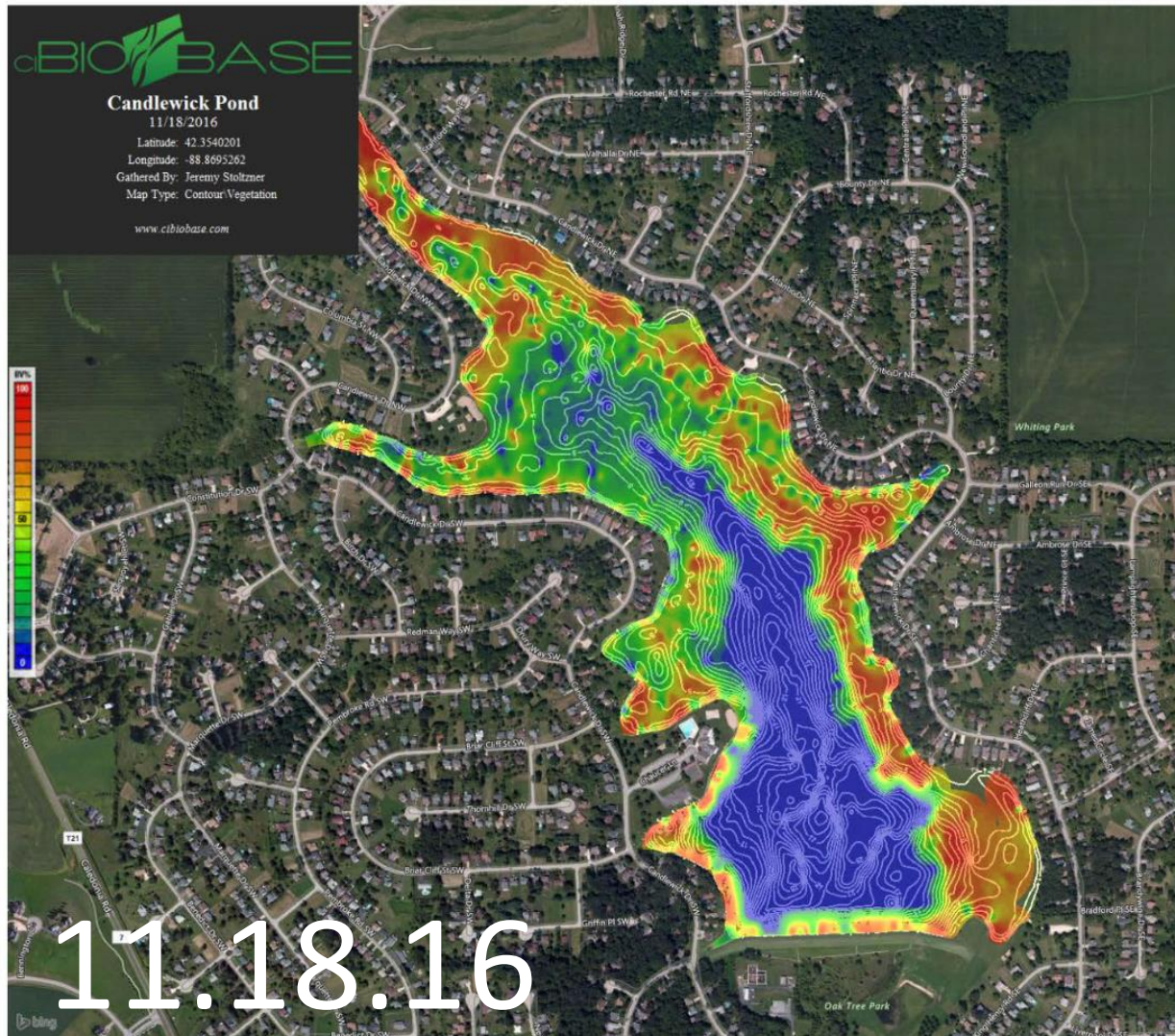
- Provide relief for the 2017 season.
- 102 Acres treated using diquat + copper





# Temporary Relief Stage

## Pre- / Post- Treatments





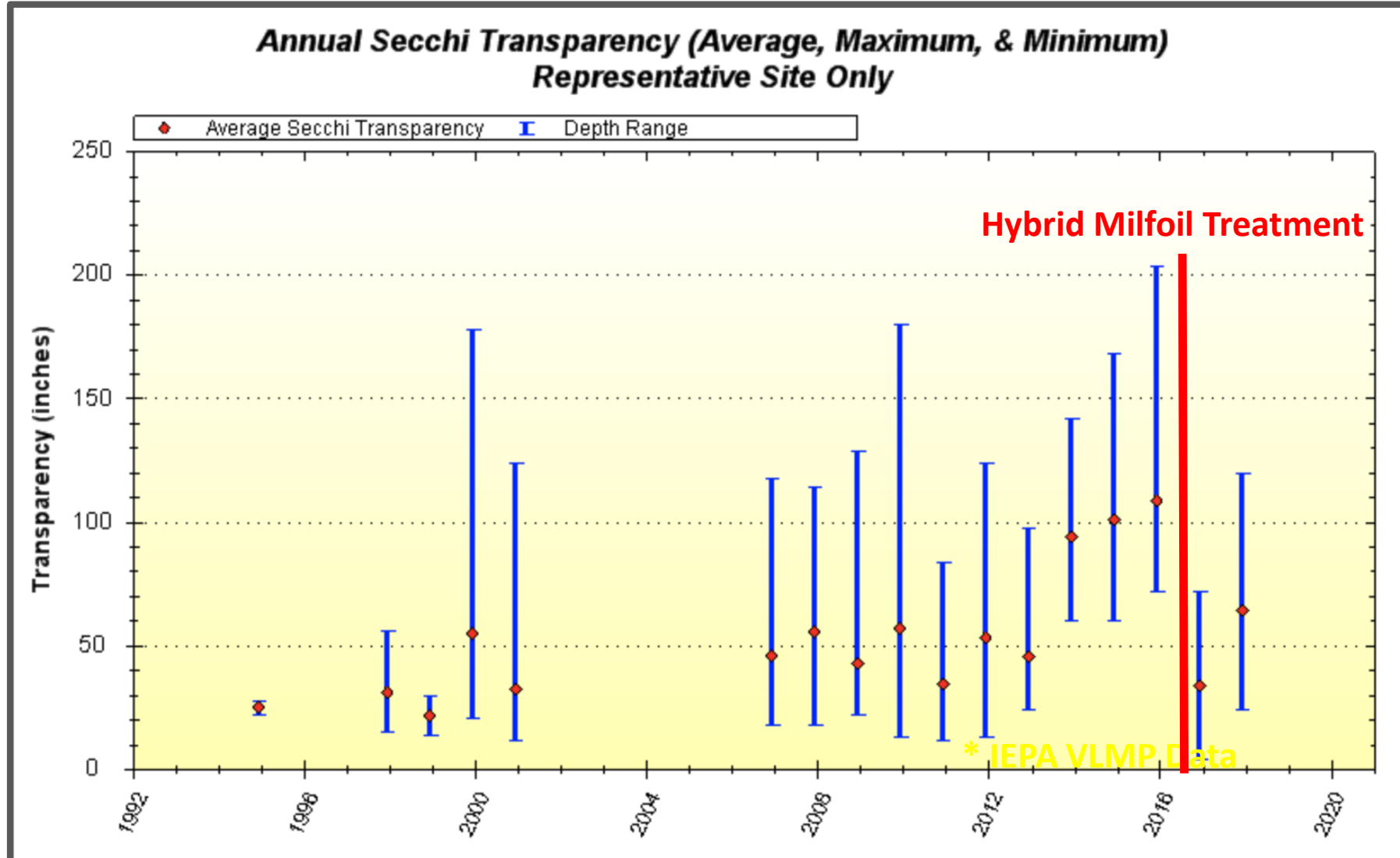
# Water Quality

**Jad Eco**

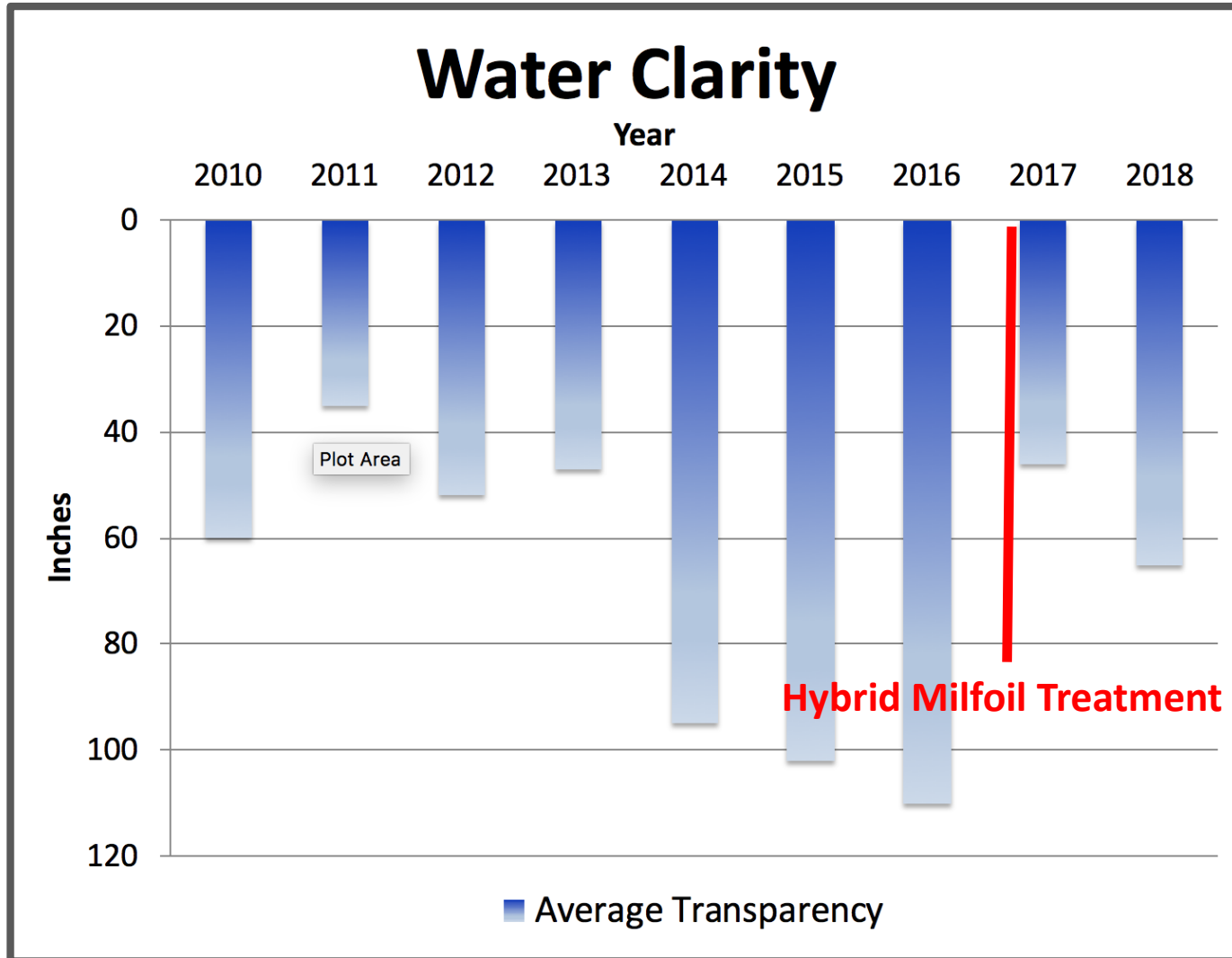
LAKES AND NATURAL RESOURCES  
CONSULTATION AND MANAGEMENT



# Water Quality: Transparency



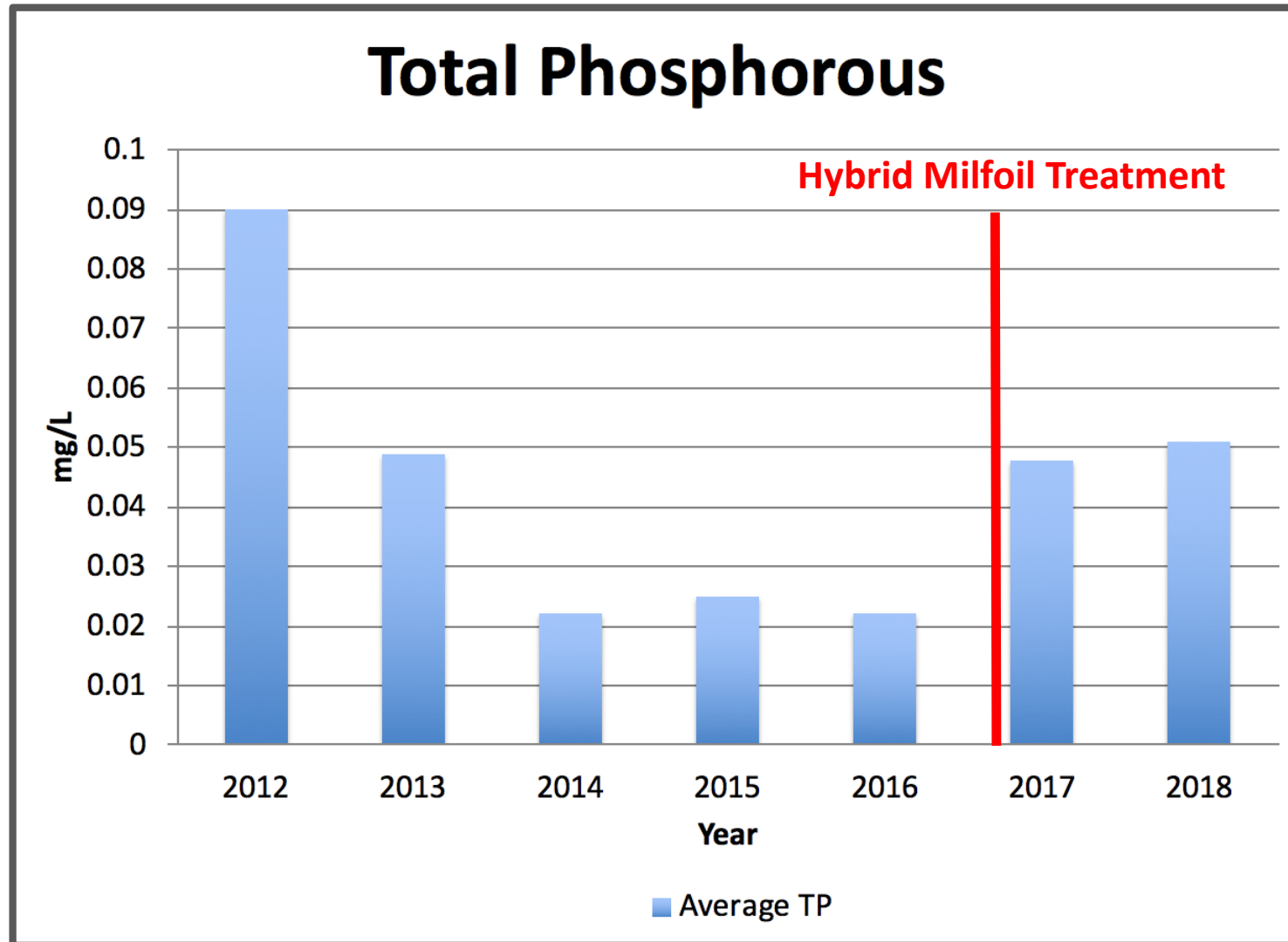
# Water Quality: Clarity



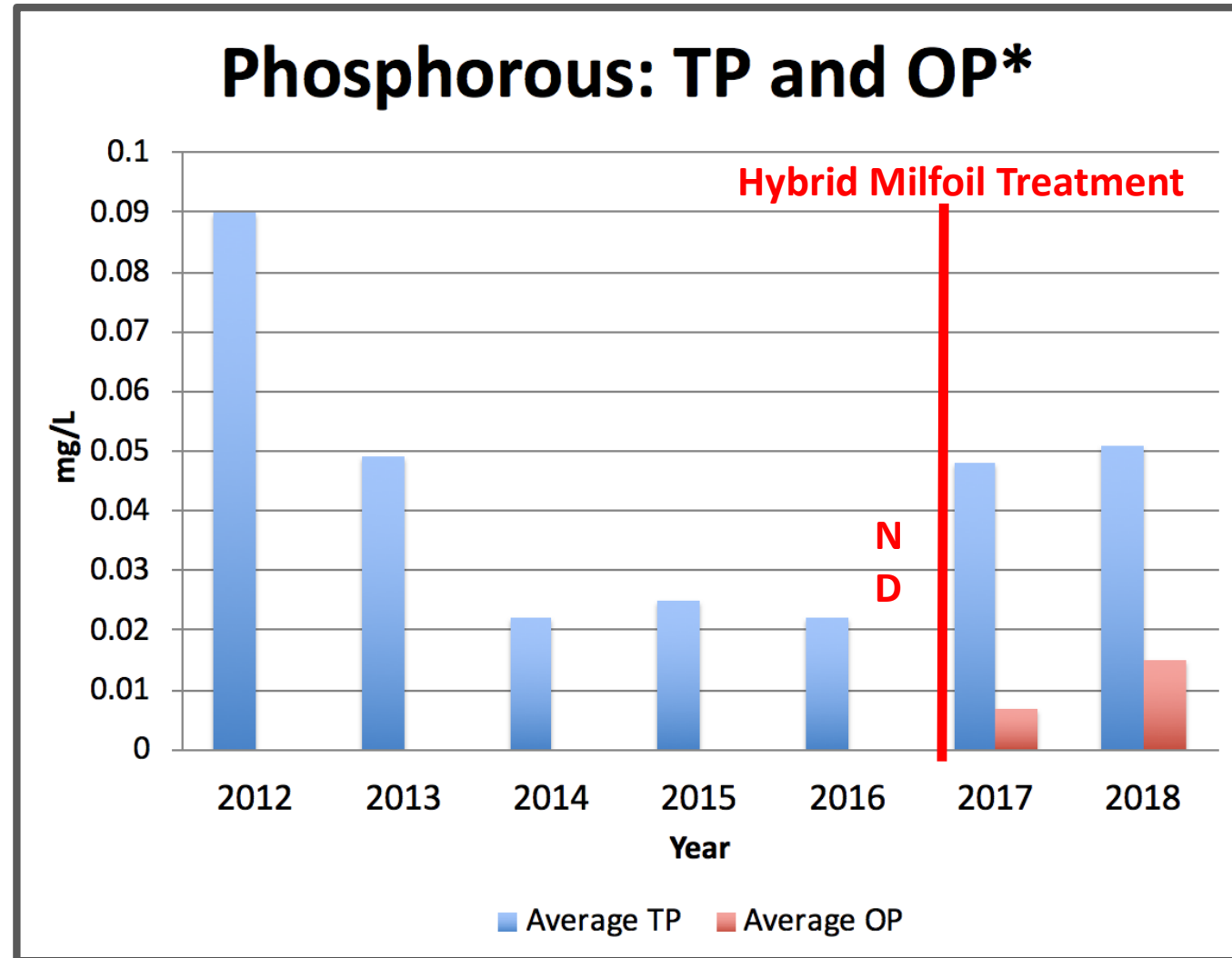
\* IEPA VLMP Data



# Water Quality: Phosphorus



# Water Quality: Phosphorus



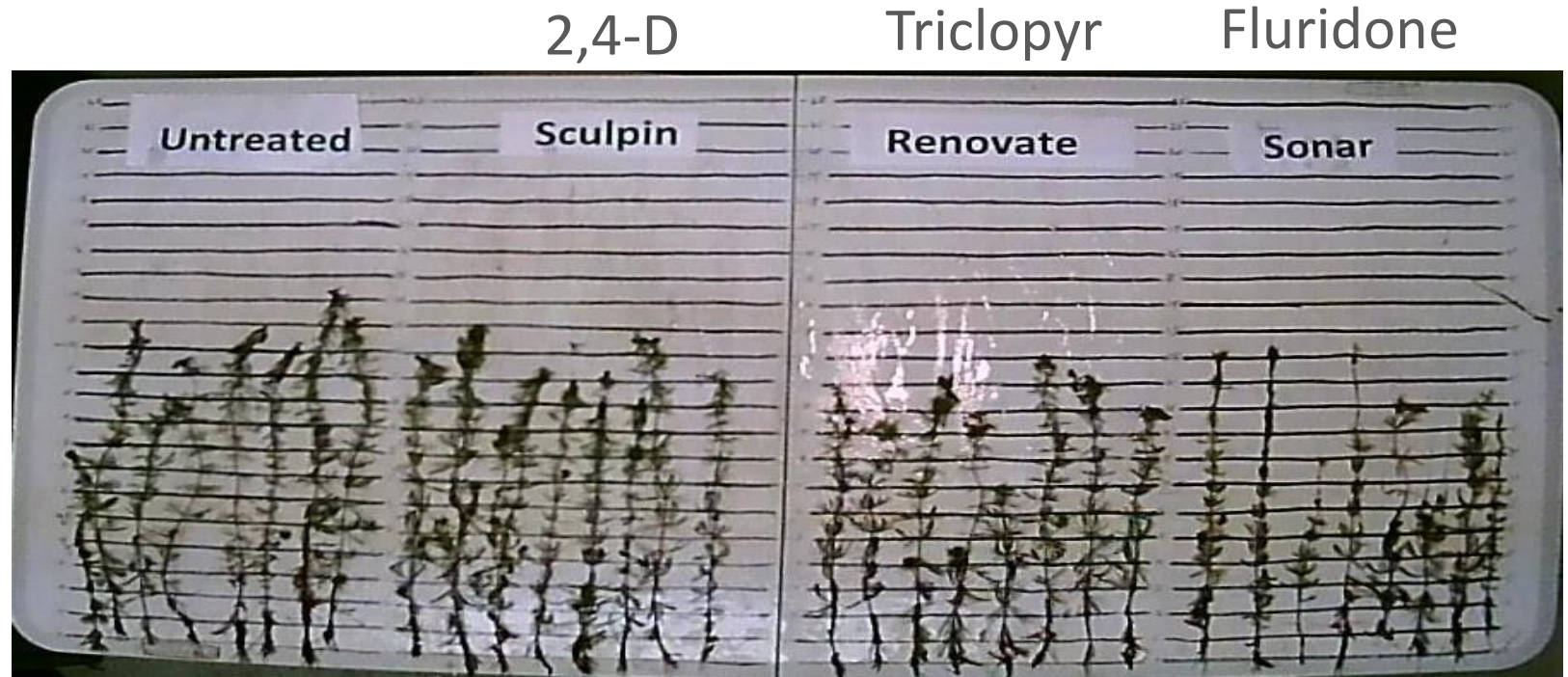
\* Ortho P unavailable before 2016



# Bioassay Results

Three AI's tested

Sonar (Fluridone) best results



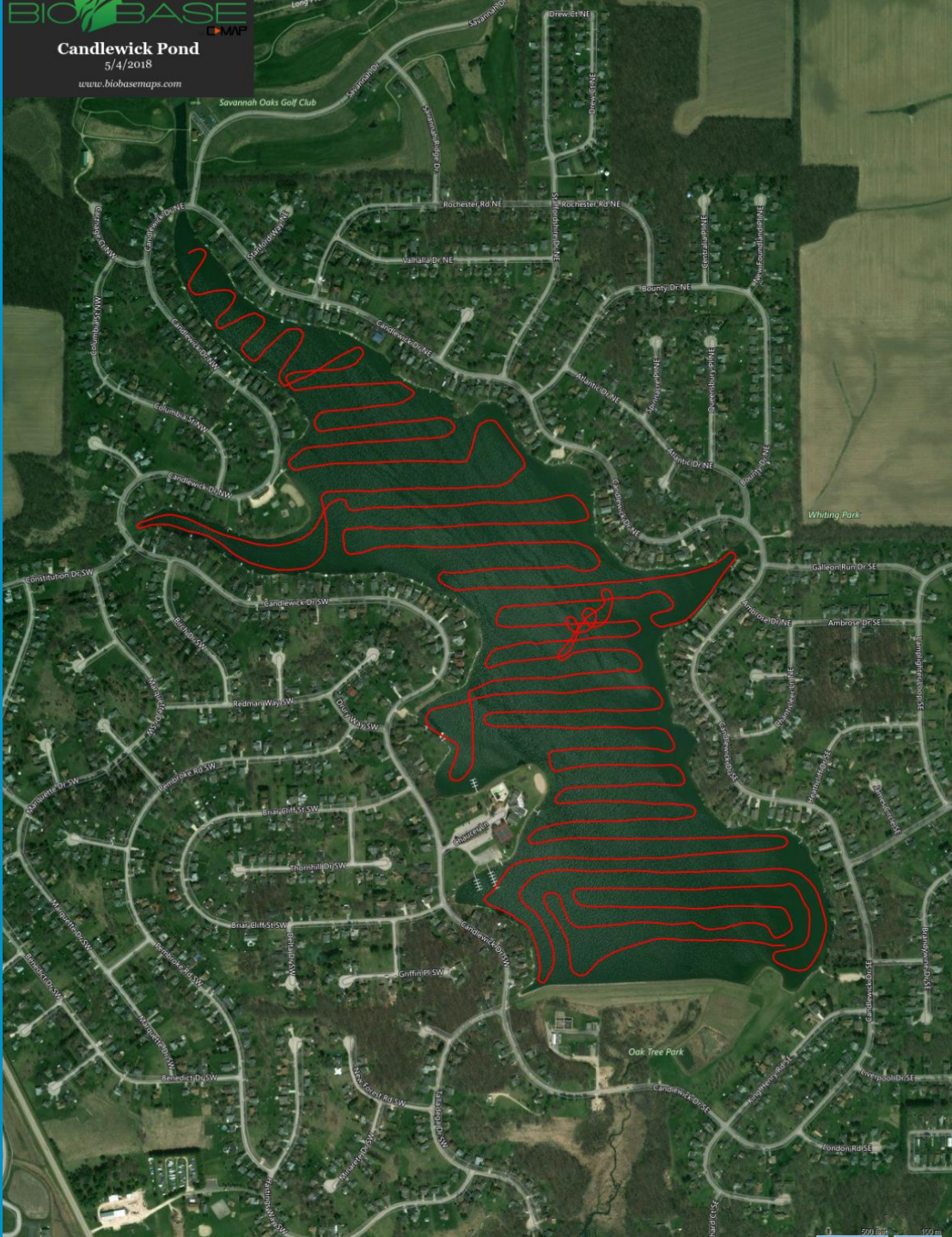


# 2018 Management Program

- Sonar AS - A.I. fluridone (systemic carotene inhibitor)
  - 6 ppb bump 6 ppb
  - FastEST ppb confirmation @ 4, 14,21,30,60, 90 days post
  - Three sites
  - Post survey at 100 days
- Early spring whole lake
  - Growing Degree Day model - Via Illinois Climate Network







# Conserve™ treatment tracks

05.04.18





Conserve™ is an advanced aquatic application system that provides the most accurate targeting and placement of product for the control of aquatic weeds and invasive species



# Conserve™ Technology

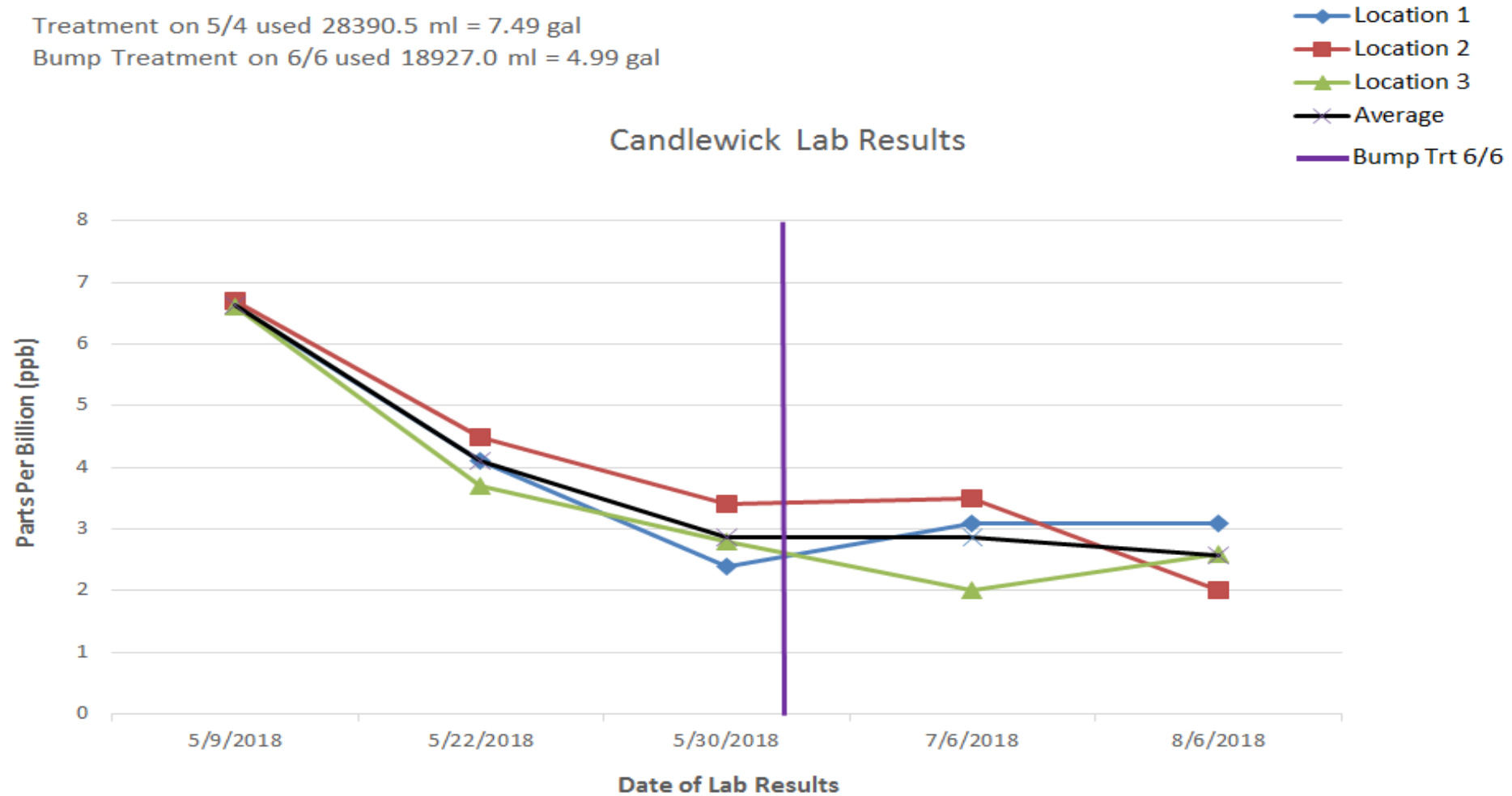






# Candlewick Lab Results

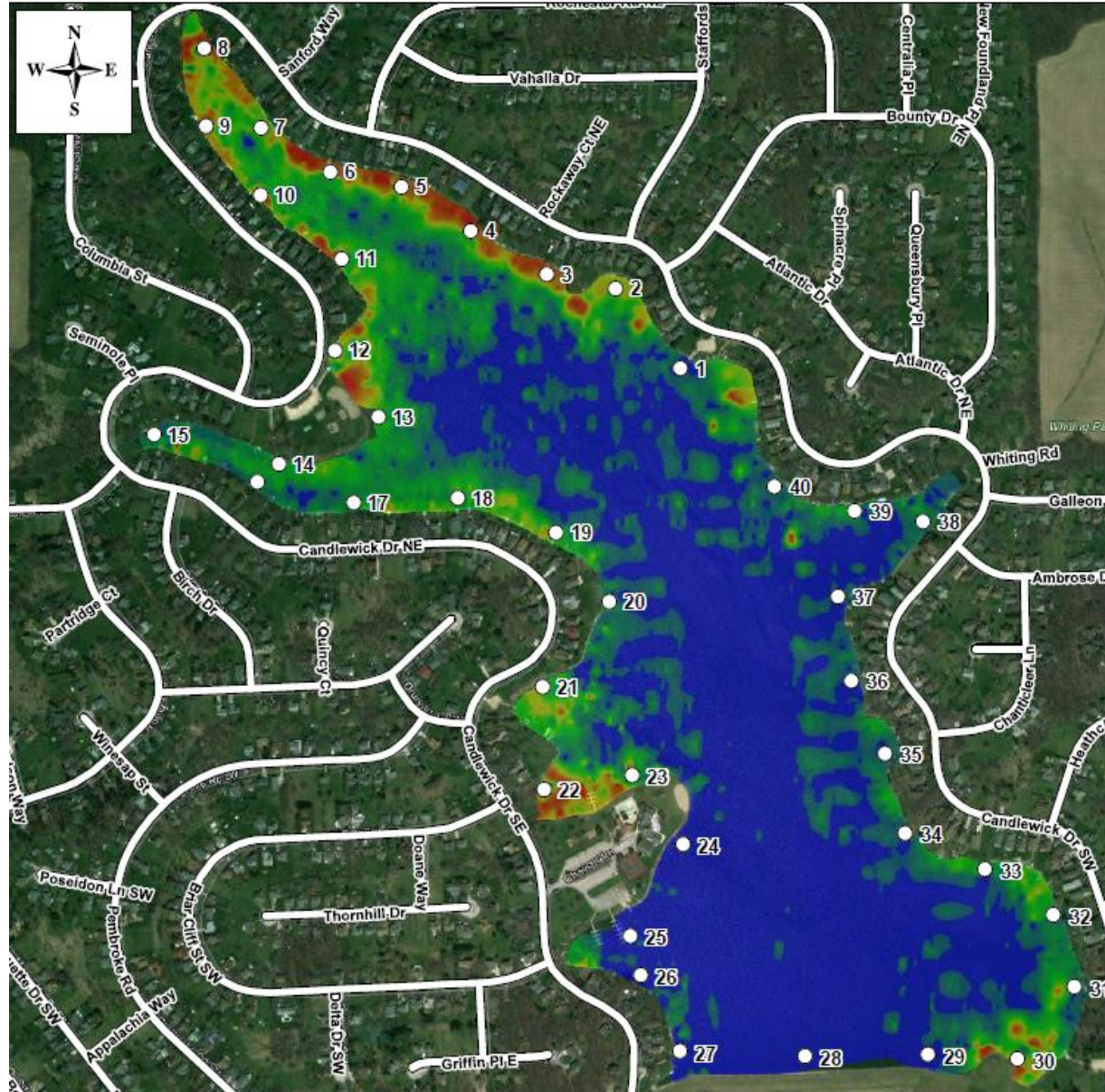
Treatment on 5/4 used 28390.5 ml = 7.49 gal  
Bump Treatment on 6/6 used 18927.0 ml = 4.99 gal





# Post treatment survey

- Visual & Rake Survey
- 40 points
- 08/09/18



# Vegetation Survey

## 100 DAT

08/09/18

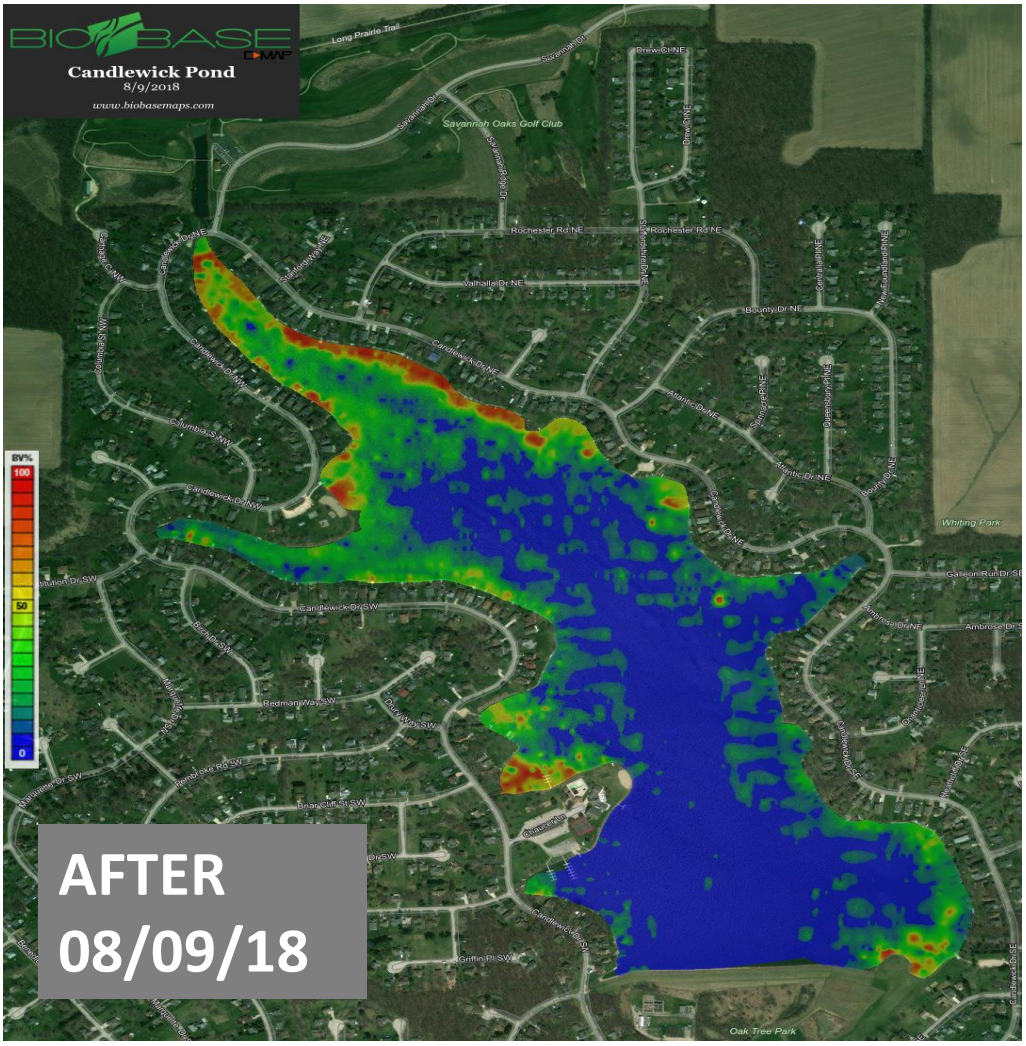
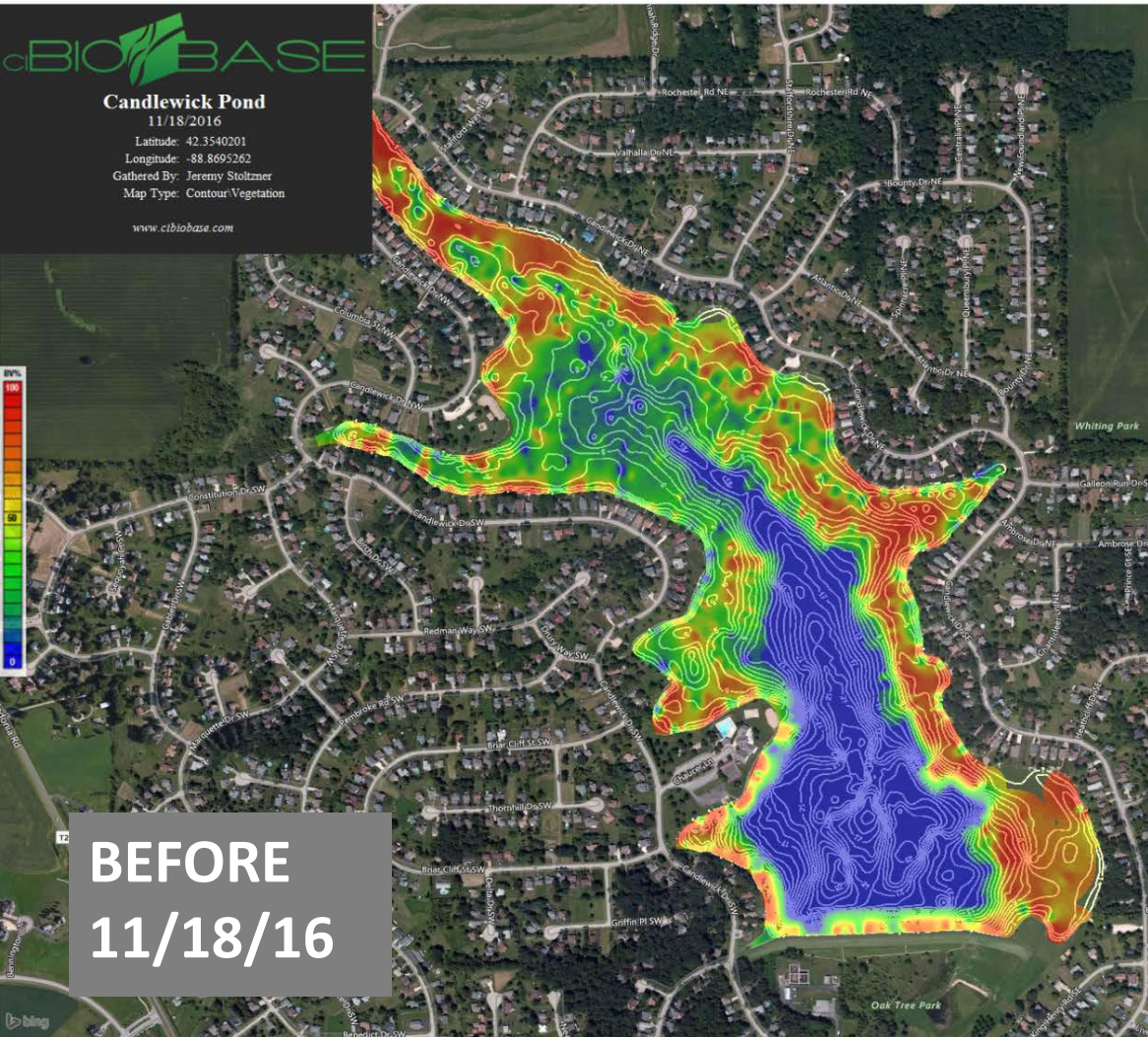
Key
H = Heavy
M = Moderate
L = Light
S = Single Plant

Site Number	Cattail	Purple Loosestrife	Sago Pondweed	Coontail	Planktonic	Chara
1		L			H	
2				L	H	
3				L	H	
4				L	H	
5			L	L	H	
6				L	H	
7					H	
8				L	H	
9				L	H	
10			L	L	H	
11	L			L	H	
12	L	L			H	L
13					H	L
14				L	H	L
15				L	H	L
16					H	L
17					H	
18			L	L	H	L
19				L	H	L
20	L			L	H	L

Site Number	Cattail	Purple Loosestrife	Sago Pondweed	Coontail	Planktonic	Chara
21	L		L	L	H	L
22			L		H	M
23				L	H	
24					H	
25				L	H	M
26				L	H	L
27	L				H	
28					H	
29					H	L
30			L		H	M
31	L				H	H
32					H	H
33					H	M
34					H	
35					H	
36					H	
37					H	L
38				L	H	
39				L	H	
40		L	L		H	L



# 100 DAT



# Results

- Well Executed Plan
  - Adhered to original goals
  - Maintained ppb concentrations.
  - No surprises
  - Hybrid watermilfoil NOT observed in 100 DAT survey
  - Coontail, Sago Pondweed, Chara





# 2019 & beyond

- Continue vegetation surveys
- Allow native vegetation to re-establish
- Watch coontail - may become dominate and dense
- Water quality monitoring



# 2019 & beyond

- Algae – In house monitoring & management.
- Manage expectations of residents with communication
- Adaptive management approach





# Acknowledgments

- Theresa Balk, GM, Candlewick Lake Association
- Candlewick Lake Association Community
- Joe Rush, JadEco
- SePRO Corporation
- BioBase Mapping
- Jeremy Stoltzner



Questions?

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Thank You